

REMARKS

Status of the Claims

Claims 1-34 and 39-42 are pending, with claims 1, 12, 23, 27, and 39 being independent. In order to expedite prosecution, claims 35-38 have been canceled as directed to non-elected subject matter pursuant to the restriction requirement. Applicants have no intention of abandoning any non-elected subject matter and expressly reserves the right to file one or more continuation and/or divisional applications directed to the non-elected subject matter.

Claims 15, 29, 33, and 34 have been amended to correct minor typographical errors. Additionally, Claim 39 has been amended to even more clearly recite and distinctly claim the present invention. Support for the claim amendments may be found throughout the specification, including, in the original claims. Therefore, no new matter has been added.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the following remarks.

Claim Rejections under 35 U.S.C. § 112

Claims 39-42 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Without conceding the propriety of the rejection, claim 39 has been amended to delete the phrase “a substantially single material”. Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 112, first paragraph has been obviated and respectfully request that the rejection be withdrawn.

Claims 1-4 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for recitation of “a substantially single material.” As claims 1-4 do not recite “a substantially single material”, Applicants believe that claims 39-42 were intended. As provided above, claim 39 has been amended to delete the phrase “a substantially single material”. Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 112, second paragraph has been obviated and respectfully request that the rejection be withdrawn.

Double Patenting

Claims 1-22 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-21 of copending Application No. 10/622,130 (“the ‘130 application”). Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

The Office Action alleges that “[a]lthough the conflicting claims are not identical, they are not patentably distinct from each other because ***both inventions recite*** an n-type and p-type diamondoid materials comprising heteroatoms of various elements.” (Office Action, page 4, emphasis added). Applicants point out that claims 1-21 of the ‘130 application (“Heterodiamondoids”) do ***not*** recite either “n-type” or “p-type” diamondoid materials. Accordingly, Applicants respectfully submit that the claims are patentably distinct and respectfully request that this rejection be withdrawn.

Claims 23-34 and 39-42 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-21 of the ‘130 application in view of Diamond Films and Coatings, Chapter 8, 1993, Noyes Publications, Park Ridge, NJ, USA (“Davis”). Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

The Office Action states that

Claims 1-21 of copending Application No. 10/622,130 teach substantially the entire claimed structure, as recited in claims 23-34 and 39-42, except using the n-type and p-type diamondoid materials in practical application such as transistors and diodes. Davis teaches in section 6.0 using the n-type and the p-type diamondoid materials in practical applications such as transistors and diodes.

(Office Action, Page 4).

Applicants point out that claims 1-21 of the ‘130 application (“Heterodiamondoids”) do not recite the following:

- a) an “electrical *p-n* junction”, a “*p*-type diamondoid material”, or an “*n*-type diamondoid material”, as recited in claim 23;
- b) a “diamondoid transistor”, an “*n*-type heterodiamondoid material”, or a “*p*-type diamondoid material”, as recited in claim 27; or

c) a “diamondoid transistor”, “electrically conducting regions”, “*n* and *p*-type heterodiamondoid materials”, “electrically insulating regions”, or “undoped diamondoid materials”, as recited in claim 39.

Applicants further point out that Davis relates to electronic applications of *diamond* films and coatings, *not* applications of *diamondoid* materials.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1-34 and 39-42 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1 and 6-8 of copending Application No. 10/621,956 (“the ‘956 application”) in view of Davis. Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

The Office Action states that

Claims 1 and 6-8 of copending Application No. 10/621,956 teach substantially the entire claimed structure, as recited in claims 1-34 and 39-42, except using an *n*-type and a *p*-type diamondoid materials in practical applications such as transistors and diodes. Davis teaches in section 6.0 using an *n*-type and a *p*-type diamondoid materials in practical applications such as transistors and diodes.

(Office Action, Page 5).

Applicants point out that claims 1 and 6-8 of the ‘956 application (“Optical uses of diamondoid-containing materials”) do not recite the following:

a) an “*n*-type diamondoid material” or an “electron-donating heteroatom”, as recited in claim 1;

b) a “*p*-type diamondoid material” or an “electron-withdrawing heteroatom”, as recited in claim 12;

c) an “electrical *p-n* junction”, a “*p*-type diamondoid material”, or an “*n*-type diamondoid material”, as recited in claim 23;

d) a “diamondoid transistor”, an “*n*-type heterodiamondoid material”, or a “*p*-type diamondoid material”, as recited in claim 27; or

e) a “diamondoid transistor”, “electrically conducting regions”, “*n* and *p*-type heterodiamondoid materials”, “electrically insulating regions”, or “undoped diamondoid materials”, as recited in claim 39.

Again, Applicants further point out that Davis relates to electronic applications of *diamond* films and coatings, *not* applications of *diamondoid* materials.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim Rejections under 35 U.S.C. § 102

Claims 1-7, 12-18, 23-34, and 39-42 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Davis. Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

As noted above, Davis relates to electronic applications of *diamond* films and coatings.

In contrast, embodiments of the presently claimed invention are directed in general toward *n* and *p*-type materials fabricated from heteroatom-containing *diamondoids*. (page 1, lines 15-18). As defined in the present specification, the term “diamondoids” refers to substituted and unsubstituted caged compounds of the adamantane series including adamantane, diamantane, triamantane, tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, undecamantane, and the like, including all isomers and stereoisomers thereof. (page 13, lines 12-15). Also as defined in the present specification, the term “heterodiamondoid” refers to a diamondoid (as defined above) that contains a heteroatom typically substitutionally positioned on a lattice site of the diamond crystal structure. A heteroatom is an atom other than carbon, and according to present embodiments may be nitrogen, phosphorus, boron, aluminum, lithium, and arsenic. “Substitutionally positioned” means that the heteroatom has replaced a carbon host atom in the diamond lattice. Although most heteroatoms are substitutionally positioned, they may in some cases be found in interstitial sites as well. As disclosed in the present specification, feedstocks that contain large proportions of lower diamondoids and lower, but significant amounts of higher diamondoids, include, for example, natural gas condensates and refinery streams resulting from cracking, distillation, coking processes, and the like (“Isolation of diamondoids from petroleum feedstocks”). (page 16, lines 28 – page 17, line 3).

To anticipate a claimed invention under §102, a reference must teach each and every element of the claimed invention. *See Lindeman Maschinenfabrik GmbH v. American Hoist and Derrick Company*, 221 USPQ 481, 485 (Fed. Cir. 1984). MPEP § 2131.

As noted above, Davis relates to electronic applications of *diamond* films and coatings. It is respectfully submitted that in no way does Davis disclose or suggest *diamondoid* materials. In no way does Davis disclose or suggest diamondoid materials comprising an electron-donating heteroatom. As defined in the present specification and provided above, diamondoids are materials distinct from diamonds. As Davis does not disclose each and every element of claims 1-7, 12-18, 23-34, and 39-42, it cannot anticipate these claims.

For at least the above-noted reasons, withdrawal of this rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claim Rejections under 35 U.S.C. § 103

Claims 9-11 and 20-22 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Davis in view of U.S. Patent No. 5,053,434 (“Chapman”). Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

As noted above, Davis relates to electronic applications of *diamond* films and coatings, rather than applications of *diamondoid* materials.

Chapman is cited as teaching “an n-type diamondoid material being a polymerized heterodiamondoid.” (Office Action, page 7). Chapman relates to polymeric compositions comprising at least three monomers bonded through octahedrally disposed nonmetallic atoms of the monomers. Chapman discloses that adamantane exemplifies the skeletal structure of such monomers. Chapman further discloses that the adamantane polymers may include pendant substituent groups replacing one or more hydrogens of the monomer units. Applicants respectfully submit that Chapman does not disclose or suggest replacing a carbon atom in the adamantane lattice with a heteroatom. Moreover, Applicants respectfully submit that Chapman does *not* disclose an n-type diamondoid material or polymerized *heterodiamondoids*, as defined above.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143.

Applicants respectfully submit that there is no suggestion or motivation, either in Davis or Chapman or in the knowledge generally available to one of ordinary skill in the art, to combine Davis and Chapman. Applicants further respectfully submit that there is no reasonable expectation of success in combining Davis and Chapman. As provided above, Davis relates to electronic applications of **diamond** films and coatings. In contrast, Chapman relates to polymeric compositions comprising at least three monomers bonded through octahedrally disposed nonmetallic atoms of the monomers, with adamantane exemplifying these monomers. Applicants respectfully submit that the adamantane polymeric compositions of Chapman are materials quite distinct from diamond films and coatings as disclosed in Davis. Accordingly, Applicants respectfully submit that there is no suggestion or motivation to combine Davis and Chapman and there is no reasonable expectation of success in doing so.

Moreover, Applicants respectfully submit that even if there were some suggestion or motivation to combine Davis and Chapman and a reasonable expectation of success, Davis and Chapman, even when combined, do not disclose or suggest all the claim limitations. As noted above, Davis relates to electronic applications of **diamond** films and coatings, rather than applications of **diamondoid** materials. Also as described above, Chapman relates to polymeric compositions comprising at least three monomers bonded through octahedrally disposed nonmetallic atoms of the monomers, with adamantane exemplifying these monomers. However, Applicants respectfully submit that Chapman does **not** disclose an n-type diamondoid material or polymerized **heterodiamondoids**, as defined above.

Therefore, even if combined, Davis and Chapman do not disclose or suggest *n*-type diamondoid materials comprising an electron-donating heteroatom. Moreover, even if combined, Davis and Chapman do not disclose or suggest *n*-type diamondoid materials comprising an electron-donating heteroatom wherein the material is a polymerized heterodiamondoid. In addition, even if combined, Davis and Chapman do not disclose or suggest *p*-type diamondoid materials comprising an electron-donating heteroatom. Moreover, even if combined, Davis and Chapman do not disclose or suggest *p*-type diamondoid materials

comprising an electron-donating heteroatom wherein the material is a polymerized heterodiamondoid.

For at least the above-noted reasons, withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully requested.

As set forth in the Office Action, claims 8 and 19 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Davis in view of Chapman. Applicants note that the content of the rejection references “Ashjian et al.” (presumably, U.S. Patent No. 5,400,427 with Ashjian as the first named inventor, listed on the Notice of References Cited accompanying the Office Action). Accordingly, Applicants believe that intended rejection was of claims 8 and 19 as being unpatentable over Davis in view of Ashjian and this combination is the rejection that is addressed herein. Applicants respectfully disagree with this rejection; therefore, this rejection is traversed.

As noted above, Davis relates to electronic applications of *diamond* films and coatings, rather than applications of *diamondoid* materials.

Ashjian is cited as teaching “a diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.” (Office Action, Page 8). Ashjian discloses a fiber optic cable assembly comprising at least one optical fiber and a grease in contact with the optical fiber, wherein the grease comprises a diamondoid component. (Abstract and claim 1). Ashjian further discloses that the diamondoid component of the grease are diamondoid compounds selected from methyl-substituted and ethyl-substituted adamantane, diamantane, and triamantane and Ashjian lists diamondoid compounds suitable for use in the grease composition, including methyl- and ethyl- substituted adamantanes, diamantanes, and triamantanes, and iso-tetramantane and anti-tetramantane. (column 3, lines 31-36 and Table 2). Ashjian does *not* disclose or suggest heterodiamondoids, as defined in the present specification and provided above. In addition, Ashjian does *not* disclose or suggest any pentamantanes, hexamantanes, heptamantanes, octamantanes, nonamantanes, decamantanes, or undecamantanes.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the

knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143.

Applicants respectfully submit that there is no suggestion or motivation, either in Davis or Ashjian or in the knowledge generally available to one of ordinary skill in the art, to combine Davis and Ashjian. Applicants further respectfully submit that there is no reasonable expectation of success in combining Davis and Ashjian. As provided above, Davis relates to electronic applications of *diamond* films and coatings. In contrast, Ashjian discloses a fiber optic cable assembly comprising at least one optical fiber and a grease in contact with the optical fiber wherein the grease comprises a *diamondoid* component, wherein the diamondoid components are selected from methyl-substituted and ethyl-substituted adamantane, diamantane, and triamantane. Applicants respectfully submit that the grease filler material comprising a diamondoid component of Ashjian is quite distinct from diamond films and coatings as disclosed in Davis. Accordingly, Applicants respectfully submit that there is no suggestion or motivation to combine Davis and Ashjian and there is no reasonable expectation of success in doing so.

Moreover, Applicants respectfully submit that even if there were some suggestion or motivation to combine Davis and Ashjian and a reasonable expectation of success, Davis and Ashjian even when combined do not disclose or suggest all the claim limitations. As noted above, Davis relates to electronic applications of *diamond* films and coatings, rather than applications of *diamondoid* materials. Also as described above, Ashjian relates to a fiber optic cable assembly comprising at least one optical fiber and a grease in contact with the optical fiber wherein the grease comprises a *diamondoid* component, wherein the diamondoid components are selected from methyl-substituted and ethyl-substituted adamantane, diamantane, and triamantane. However, Applicants respectfully submit that Ashjian does *not* disclose an n-type diamondoid materials comprising an electron-donating heteroatom, p-type diamondoid materials comprising an electron-donating heteroatom, *heterodiamondoids* (as defined in the present specification and provided above), or heterodiamondoids selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, or undecamantane.

Therefore, even if combined, Davis and Ashjian do not disclose or suggest *n*-type diamondoid materials comprising an electron-donating heteroatom. Moreover, even if combined, Davis and Ashjian do not disclose or suggest *n*-type diamondoid materials comprising an electron-donating heteroatom wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, or undecamantane. In addition, even if combined, Davis and Ashjian do not disclose or suggest *p*-type diamondoid materials comprising an electron-donating heteroatom. Moreover, even if combined, Davis and Ashjian do not disclose or suggest *p*-type diamondoid materials wherein the diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, or undecamantane.

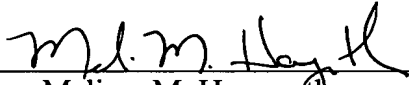
For at least the above-noted reasons, withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully requested.

Conclusion

Without conceding the propriety of the rejections, the claims have been amended, as provided herein, to even more clearly recite and distinctly claim Applicants' invention and to pursue an early allowance. For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims.

In view of the foregoing amendments and remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited. In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

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